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Filed : September 11, 2003

REMARKS

I. Disposition of the Claims

Claims 1-14, 16-20 are currently pending. Claims 1, 2, 3, 4, 13 and 14 have been amended. Claim 15 has been canceled.

Claims 1 and 2 have been amended as to specify the structure of the fabric used in the composite in more detail. Basis for these amendments can be found in original claims 1 and 2, and in the specification as filed, particularly in paragraphs [0041], [0044], [0045], [0047], [0061], [0070], [0097], [0118], and [0103]. Basis for the use of reinforcement elements containing metal and steel threads can be found in paragraph [0059] and the examples in paragraphs [0146], [0148], [0149], [0150], [0151], [0152], [0153], [0154], [0155], [0157] and in original claims 13-14.

Claims 3 and 4 have been amended by deleting the term “preferably” and related phrases.

Claim 13 has been amended for reasons of clarity by deleting “partly or wholly” electro-conductive, and “at least partly” insulated. In claim 13, the term “individual element” has been amended in “reinforcement element” for reasons of consistency.

The typographical error has been amended in claim 14.

In claim 19, the term “reinforced element” has been amended to “reinforcement element” for reasons of clarity

II. Compliance with 35 USC 112

The Office has rejected Claims 15 and 19 under 35 USC 112, first paragraph, for lack of enablement. With regard to the objection for original claim 15, we have deleted this claim.

With regard to the objection for original claim 19, it is submitted that metal or steel threads (i.e. a reinforcement element containing such threads) with joints or weakening points for enabling folding thereof and a method for making such threads are well known in the art. Therefore, to our opinion a person of skilled in the art will with no doubt know how such type of threads is to be made.

The Office has rejected Claims 1-20 under 35 USC 112, second paragraph, for being indefinite. The Office has indicated that the definition of what is meant by an “individual element that is reinforced” is not clear. It is submitted that the term individual element is explained in the

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text in [0070]. Regarding the terms “reinforcement or reinforced element”, it is evident for a person of skilled in the art that the terms “reinforcement element and reinforced element” are used as synonyms and that this term refers to a yarn, fiber, or the like which has a high resistance against breaking. The application provides examples (see figures 1 to 19) of metal and steel yarns which are used as reinforcement elements. Therefore, we have amended the term “individual element that is reinforced” in claims 1 and 2 to “metal or steel thread containing reinforcement element”. In claim 18, the term “reinforced element” has been amended to “reinforcement element” for reasons of consistency with claims 1 and 2. In claim 13, the term “individual element” has been amended in “reinforcement element” for reasons of consistency.

The Office further objected to the use of the terms “preferably” and “in preference” in Claims 3 and 4, respectively. Please note that these terms have been deleted from said claims.

The Office further rejected Claims 13-16 because it was not clear how at least one element may be wholly electro-conductive and at least partially insulated. In response, this claim has been amended by deleting “partly or wholly” electro-conductive, and “at least partly” insulated.

III. Novelty and Obviousness

The office has rejected Claims 1, 3-7, 9, 13, 16, 18, and 20 under 35 USC § 102(b) as anticipated, or, in the alternative, under 35 § USC 103(a) as obvious over U.S. Patent No. 4,404,889 to Miguel (D1). The office has rejected Claims 1-8, 13-15, and 17-20 under 35 USC § 102(b) as anticipated, or, in the alternative, under 35 USC § 103(a) as obvious over U.S. Patent No. 5,503,879 to Cochran (D2). The office has rejected Claims 1-2, 5-9, 13-18 and 20 under 35 USC § 102(b) as anticipated, or, in the alternative, under 35 USC § 103(a) as obvious over U.S. Patent No. 5,137,766 to Mazanek (D3).

NOVELTY

For the reasons described below, Applicant submits that amended independent claims 1 and 2 are novel with respect to D1, D2 and D3.

Amended claims 1 and 2 now refer to a composite comprising a matrix, provided on at least one side with a fabric and at least one insulating layer interposed between said matrix and said fabric. The fabric in the composite has been further defined.

In particular, the fabric contains two, three, four or more individual layers of metal or steel thread containing reinforcement elements, said individual layers of reinforcement elements being superimposed onto each other and arranged under an angle with respect to each other which differs from 90°. In addition, the reinforcement elements in the fabric layers are not interwoven but have an indirect connection. This connection is created by a stitching, tufting or knitting yarn which is weaker than the reinforcement element. In amended claim 2 it is further defined that in each of the individual layers of the fabric all reinforcement elements are provided in only one same, parallel, direction.

D1 (US 4,404,889 (Miguel)) discloses a composite armor consisting of several layers of material. As illustrated on figure 1, the composite consists of a matrix (10 or 22) that is provided on one side with a fabric (16) and an insulating layer (14 or 18) which is provided in between the matrix and the fabric.

However, it is noted that the fabric applied in the disclosed composite consists of a Kevlar nylon woven material that is impregnated with micropheres/elastomers. Such fabric is clearly different from the fabric applied in the presently claimed invention. The fabric of D1 does not comprise metal or steel threads containing reinforcement elements but consists of nylon. Moreover, the elements of the fabric in D1 are interwoven, in contrast to the reinforcement elements of the present fabric which are not interwoven but indirectly interconnected. Furthermore, the connection elements in the fabric of D1 are said to be elastomer impregnators. In contrast, the connection elements in the present fabric are not chemicals but a connection yarn that can be stitched, tufted or knitted in the fabric. We further note that the fabric of D1 does not refer to individual layers of reinforcement elements being *superimposed* onto each other. Also, D1 does not refer to a fabric wherein all reinforcement elements in an individual layer of the fabric are provided in only one same, parallel, direction.

D2: US 5,503,879 (Cohran) discloses a polymeric matrix having a fibrous component dispersed therein for reinforcement. The matrix is made of a resin which envelops the puncture resistant fibrous component with essentially no adhesion or bond between the two components. The fibrous component may comprise a fabric.

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It is submitted that the fabric used in the composite of D2 differs from the fabric applied in the presently claimed invention. The fabric of D2 comprises spectra fibers (i.e. polyolefin fibers), and in particular fibers that have been obtained following an extrusion process, while the present fabric contains metal or steel yarns. D2 does not mention the use of a connection yarn which is *stitched, tufted or knitted* as connection element in the fabric. We further note that in our view the fabric of D2 does not mention that individual layers of reinforcement elements are to be superimposed onto each other and arranged under an angle with respect to each other which differs from 90°.

D3: US 5,137,766 (Mazanek) discloses a metal fiber containing composite material. The composite material is to our understanding obtained by injection molding. The composite material contains parallel aligned metal fibers which can be construed as layers or textile structures comprising these fibers.

It is submitted that the fabric of D3 is clearly different from the fabric applied in the presently claimed invention. The reinforcement elements in the fabric of D3 are not interconnected by means of a connection yarn which is stitched, tufted or knitted. The connection element in the fabric of D3 is said to be a polymeric adhesive, while the connection elements in the present fabric are not simply chemicals. We further note that to our opinion the fabric of D3 does not have individual layers of reinforcement elements being *superimposed* onto each other and arranged under an angle with respect to each other which differs from 90°.

In view of the above, it is to our opinion clear that the present fabric, and a composite comprising such fabric, as claimed in claim 1 and 2 is different and novel vis-à-vis the fabrics and composites disclosed in any of documents D1, D2 or D3.

OBVIOUSNESS

An objective problem is to provide a composite material which has improved cutting resistance capacities. The presently claimed invention provides a solution to this problem, namely by providing a matrix, provided on at least one side with a fabric comprising individual metal reinforcement elements, having at least one insulating layer interposed between said matrix

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and said fabric. Moreover, the composite material contains a well-defined type of fabric material. The combined use of an insulation layer and a particular novel type of fabric in a composite material, enables to obtain a composite material showing extreme cut-resistance.

First, by providing an insulating layer between the fabric and the matrix, the presently claimed invention provides a composite and/or a fabric wherein the reinforcement elements in the fabric and/or composite will not act as individual elements but will act as a “group” or a “set” of elements. A major advantage of the reinforcement elements to act as a set of elements is that different elements are able to simultaneously undergo some displacement, when acting upon by a cutting element. As a consequence, individual elements will less easily be cut through, and cutting resistance of the fabric will be greatly improved. The presently claimed invention thus provides a composite having maximal cutting resistance, by enabling the anti-cutting reinforcement elements to act as free as possible, i.e. by creating “bundles” or “groups” of individual elements before a single element gets cut through.

Secondly, the present fabric used in the composite material has a surprisingly high resistance to cutting. Although the reinforcement elements in the fabric are not interwoven, but only indirectly connected by a relatively weak connection elements, such layers of fabric may be used for providing extreme cutting resistance, in particular by specifically depositing different of such layers in a specific arrangement (in certain angles different from 90°) onto each other. The present strength and cutting-resistance of the present fabric is not only a result of the reinforcement yarns as such, but also of their use in a particular arrangement.

Moreover, it is submitted that the present fabric does not comprise thermoplastic yarns, as is the case for instance in D2, but metal or steel threads. It is known that thermoplastic yarns are “bendable” and easy to handle, while metal or steel threads are much “stiff” and more difficult to work with. In view hereof a person of skill in the art would not be prompted to use this type of yarns, or to come-up to use these in the indicated way (not interwoven but connected – superposition of different layers thereof under a specific angle towards each other) for developing a fabric as in the presently claimed invention. In support thereof, it is further submitted that in order to establish the present composite and fabric concept, laborious testing was required by the Applicant in order to establish the most optimal fabric and composite configuration. This illustrates the difficulties and non-obviousness of bringing the present concept into optimal

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practice. In view hereof, it is submitted that the development of the present concept was not straightforward and required inventive skill.

We further submit that if the present technology (i.e. use of reinforcement elements that are not interwoven but connected – superposition of different layers thereof in an specific angle towards each other) was applied using Spectra fibers as disclosed in D2, no satisfying results of cut-resistant composites would be achieved. This is not only due to the technical characteristics of such polyolefin fibers (see above) but also to the fact that polyolefin fibers are less cutting resistant than metal or steel threads.

It is believed that none of the cited documents provides any suggestion or teaching for the use of a particular type of cut-resistant fabric, as explained above, in combination with an insulating layer in a composite, especially since none of the cited documents points to the application of the metal or steel reinforcement elements in the above-explained way, i.e. not interwoven but connected – superposition of different layers thereof under a specific angle different from 90° towards each other.

In view of the above, it is to our opinion clear that the present fabric, and a composite comprising such fabric, as claimed in claim 1 and 2 is non-obvious vis-à-vis the (combined) teachings of any of the cited documents.

Since the dependent claims 3-19, refer back directly or indirectly to the amended claims 1 or 2, respectively, we submit that they inherently contain the novel and non obvious features of these claims 1 or 2. Therefore, the statement of novelty and non-obviousness with respect to these claims should be positive as well.

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CONCLUSION


In view of the foregoing, Applicant respectfully requests that this application be passed to issuance. If any points remain that can be resolved by telephone, the Examiner is invited to contact the undersigned at the below-given telephone number.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

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